

FIG. 1

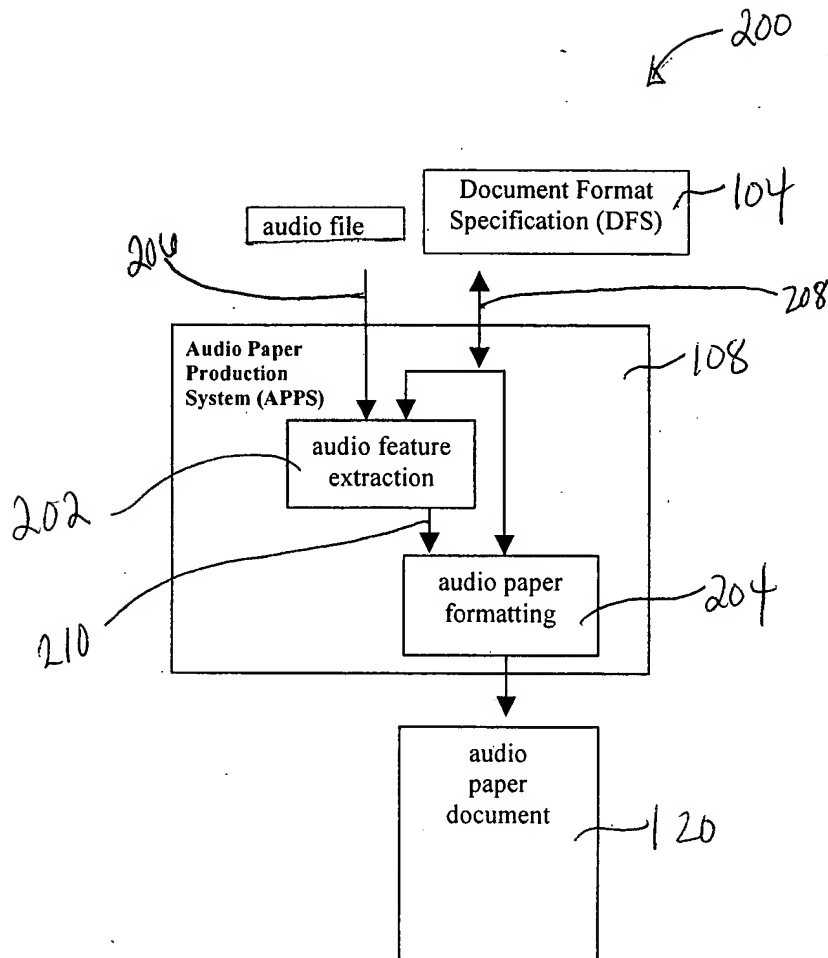


FIG. 2

APPS Processing Steps

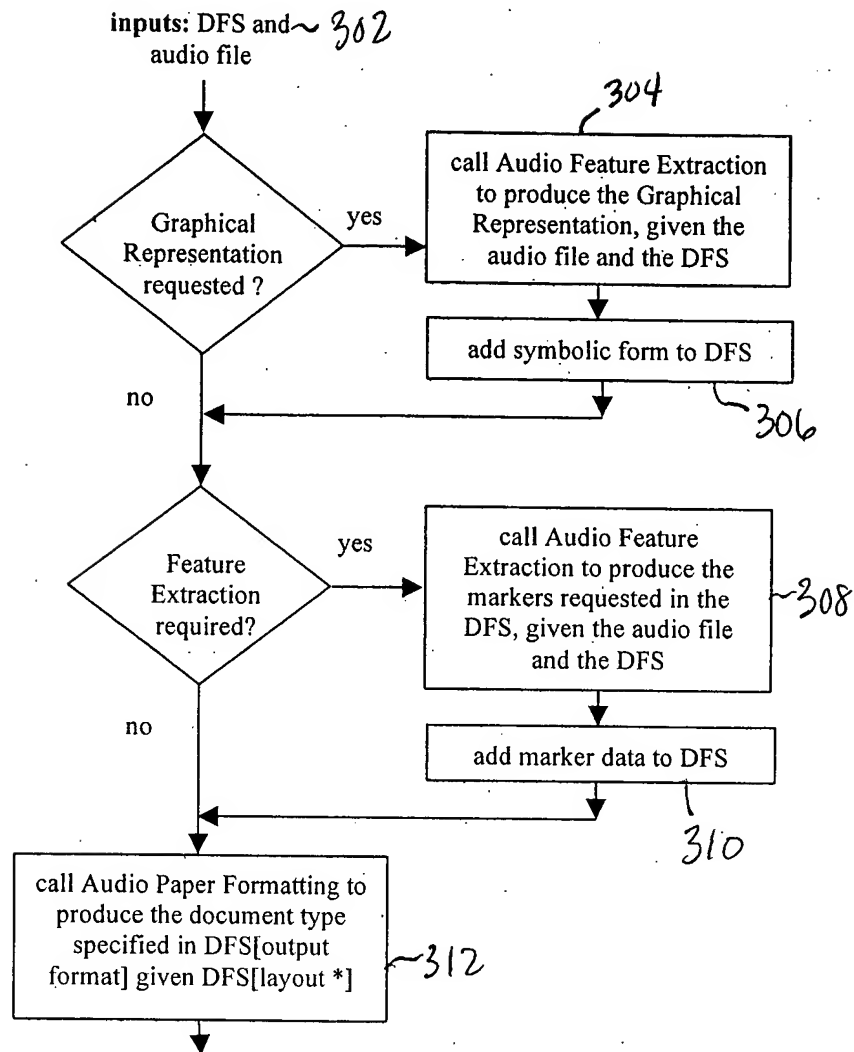


FIG. 3

Audio Paper Formatting module

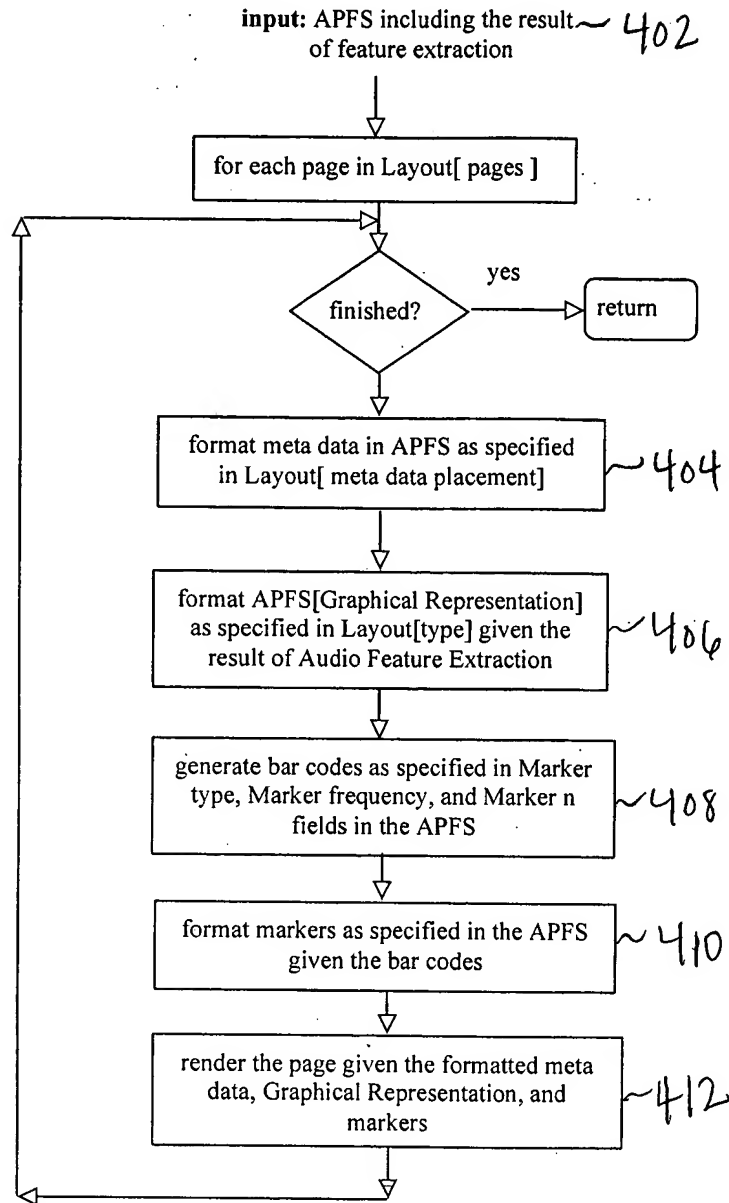


FIG. 4

Bar code generation

inputs:

- bar code type (e.g., Interleaved 2 of 5),
- no. of Identifier digits in bar code, ~502
- no. of time stamp digits in bar code,
- time stamp value

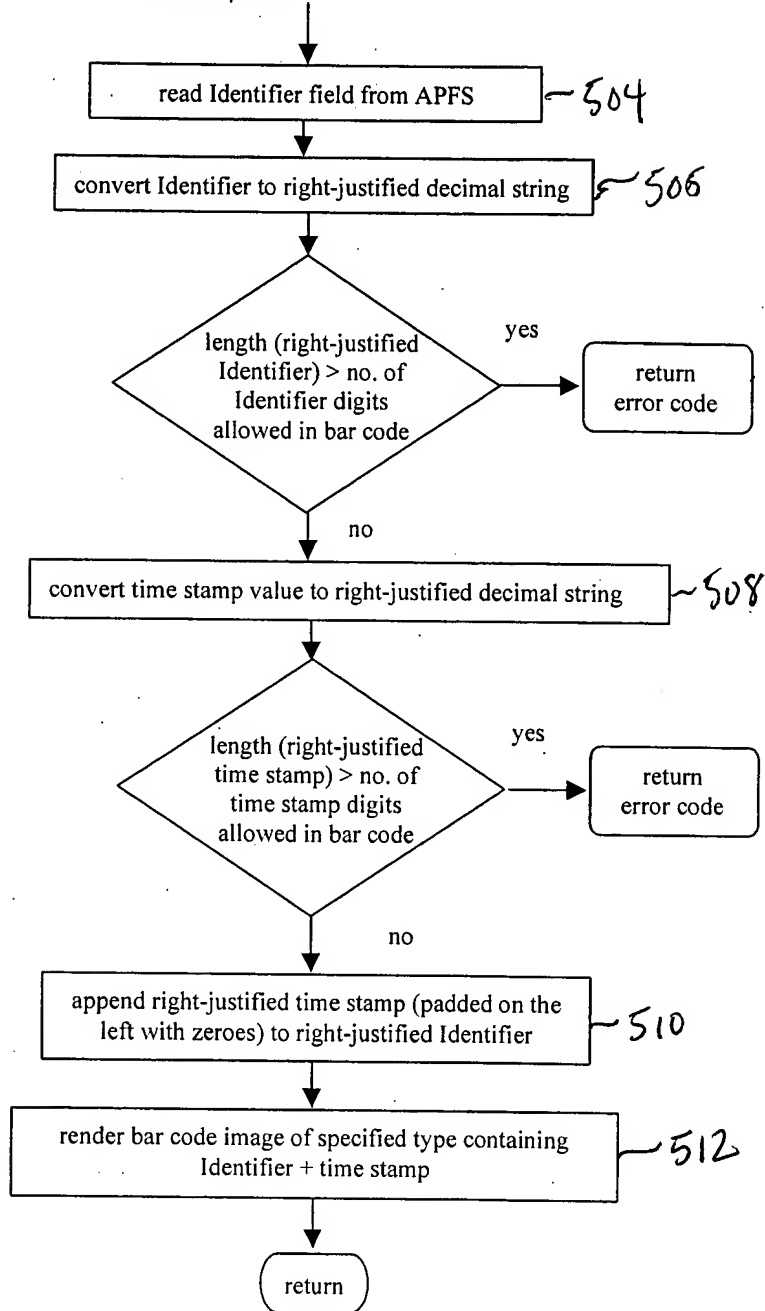


FIG. 5

104 Document Format Specification

- 604 Type = Musical recording
- 608 Identifier = 1768
- 610 Title = Locomotion
- 612 Artist = John Coltrane
- 614 Collection = Blue Train
- 616 Publisher = Blue Note Records
- 618 Publication Date = 1957
- 620 Begin time = 00:00:00
- 622 End time = 00:07:14
- 624 Graphical Representation = Amplitude curve
- 628 Marker type = bar code
- 630 Marker frequency = 30 sec. intervals
- 632 Layout type = One horizontal time line
- 634 Layout pages = 1
- 636 Layout marker placement = Above graphical representation
- 638 Layout meta data placement = Centered at top of page

Audio Feature Extraction 602

Audio amplitude extraction and graphical approximation. An svg file is output. 606

FIG 6a

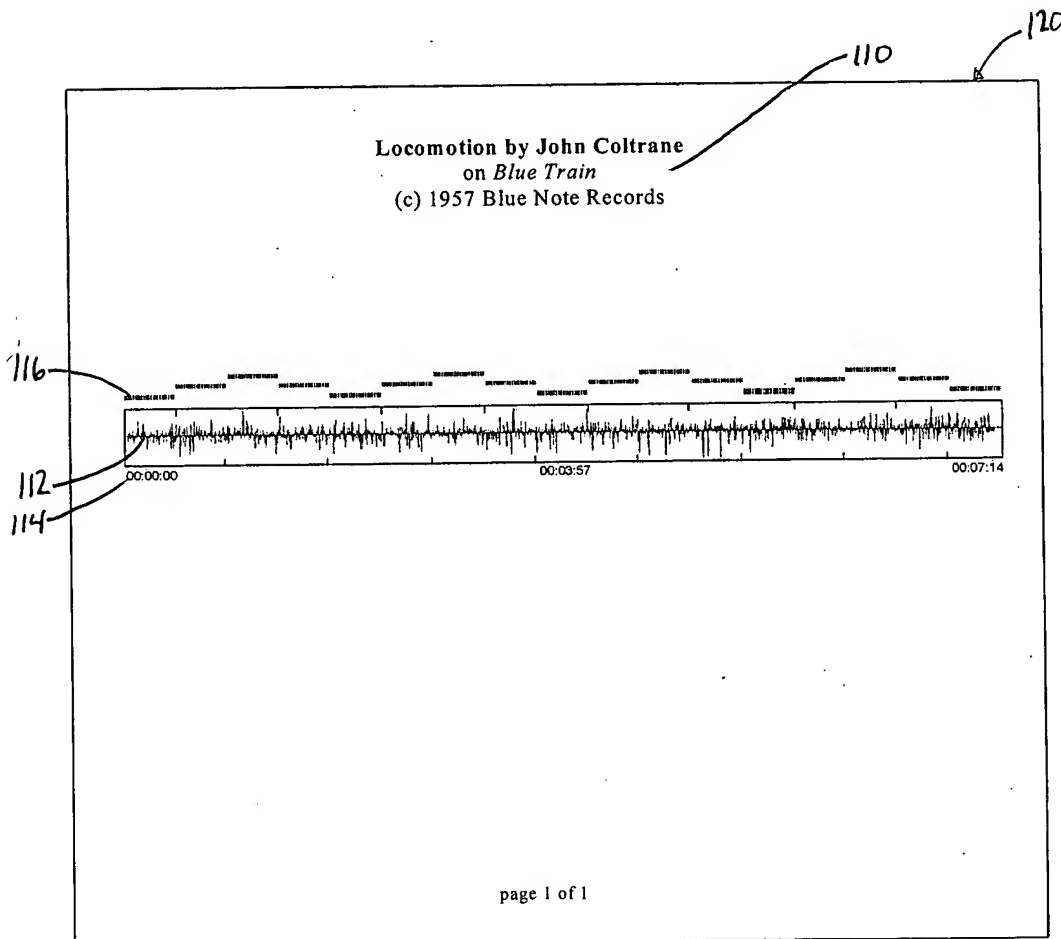


FIG. 6b

104 Document Format Specification

Type = Musical recording
 Identifier = 1769
 Title = Locomotion
 Artist = John Coltrane
 Collection = Blue Train
 Publisher = Blue Note Records
 Publication Date = 1957
 Begin time = 00:00:00
 End time = 00:07:14
 Graphical Representation = Amplitude curve
 Feature extraction = Musical solos (output is instrument name and time when solo began)
 Marker type 1 = Instrument name above bar code above time stamp
 Marker type 2 = bar code
 Marker2 frequency = 0, 50%, 100%
 Layout type = One horizontal time line
 Layout pages = 1
 Layout marker1 placement = Above graphical representation 710
 Layout marker 2 placement = Below time line 712
 Layout meta data placement = Centered at top of page

Audio Feature Extraction 602 606
 Audio amplitude extraction and graphical approximation. An svg file is output. Musical Solo extraction is also applied. It outputs the beginning times and instrument for each musical solo.

FIG. 7a

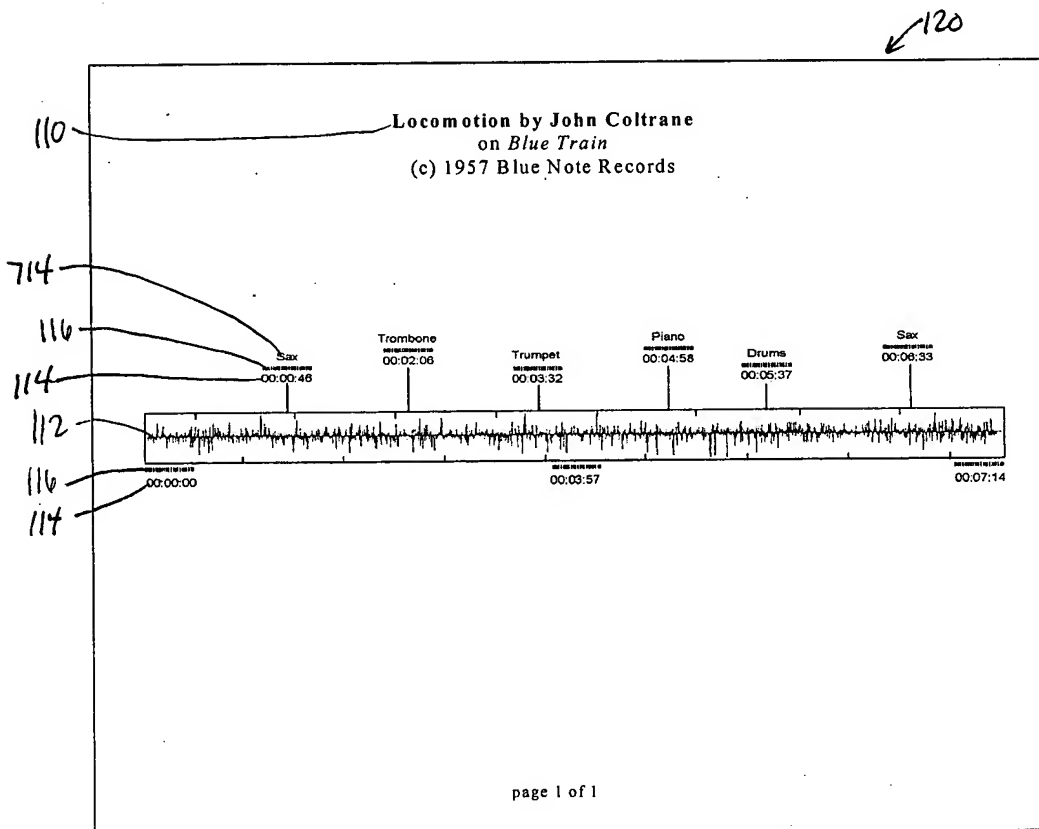


FIG. 7b

604

Document Format Specification

Type = Radio program
Identifier = 1770
Title = Fresh Air with host Terry Gross
annotation = Guest Bill O'Reilly
Publication Date = Oct. 8, 2003
Begin time = 00:00:00
End time = 00:40:45
Graphical Representation = Amplitude curve
Marker type = bar code
Marker frequency = regularly spaced
Layout type = One horizontal time line
Layout pages = 1
Layout marker placement = Above graphical representation, 3-step staircase
Layout meta data placement = Centered at top of page

802

Audio Feature Extraction

Audio amplitude extraction and graphical approximation. An svg file is output.

602

606

FIG 8a

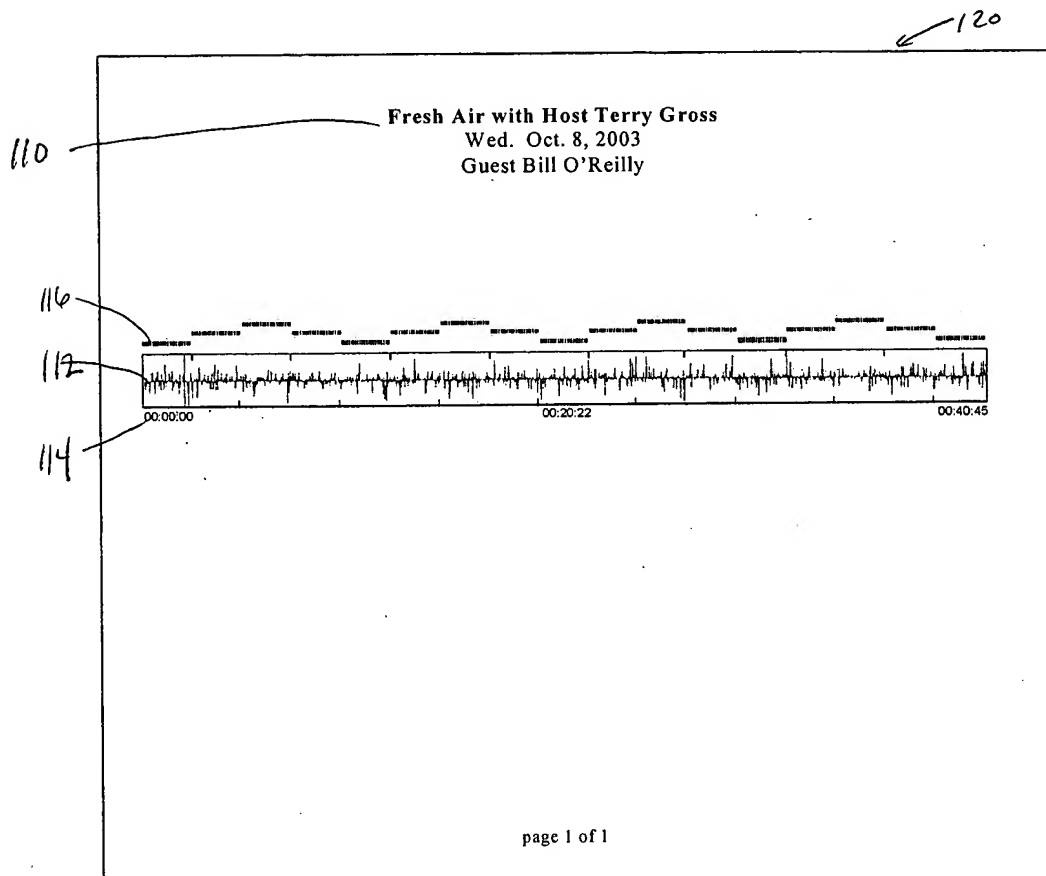


FIG. 8b

604 → Document Format Specification

Type = Radio program
 Identifier = 1771
 Title = Fresh Air with host Terry Gross
 annotation = Guest Bill O'Reilly
 Publication Date = Oct. 8, 2003
 Begin time = 00:00:00
 End time = 00:40:45
 Graphical Representation = Amplitude curve
 Marker type = keywords, bar code, time stamp
 Marker placement = above time line
 Marker frequency = user-defined
 Marker 1 = (WTC, bar code, 04:28, vert. pos. 1)
 Marker 2 = (NY Times, bar code, 09:08, vert. pos. 2)
 Marker 3 = (Peabody, bar code, 12:30, vert. pos. 3)
 ...
 Marker 11 = (People Mag, bar code, 39:10, vert. pos. 3)
 Layout type = One horizontal time line
 Layout pages = 1
 Layout marker placement = Above graphical representation, as provided
 Layout meta data placement = Centered at top of page

Audio Feature Extraction ← 602
 Audio amplitude extraction and graphical approximation. An svg file is output.

FIG. 9a

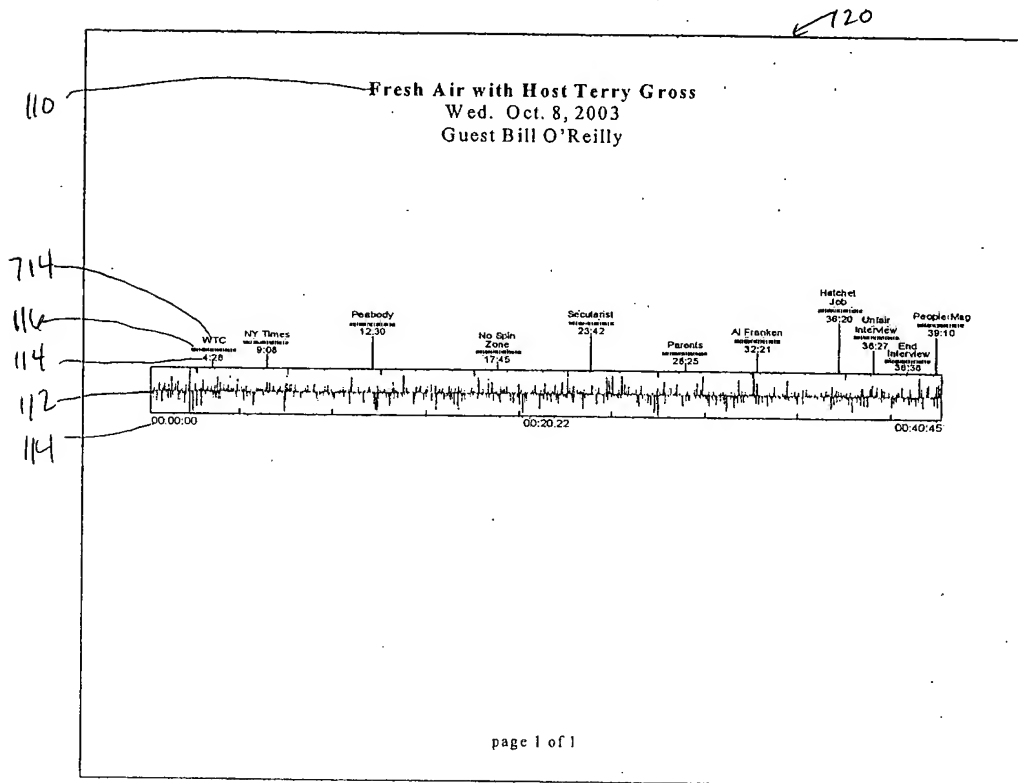


FIG. 9b

104 Document Format Specification

Type = Radio program
Identifier = 1772

Title = Fresh Air with host Terry Gross
Annotation = Guest Bill O'Reilly
keyword search terms = "New York Times" and
"fair and balanced"

Publication Date = Oct. 8, 2003
Begin time = 00:00:00
End time = 00:40:45

Graphical Representation = Amplitude curve

Feature extraction = speech recognition and keyword match to "New York Times" or "fair and balanced"

Marker type = matching search term, bar code, time stamp

Marker placement = above time line

Marker frequency = user-defined

Marker 1 = ("fair and balanced", bar code, 02:31, vert. pos. 2)

Marker 2 = ("New York Times", bar code, 04:21, vert. pos. 1)

Marker 3 = ("New York Times", bar code, 14:54, vert. pos. 2)

...

Marker 9 = ("New York Times", bar code, 35:12, vert. pos. 3)

Layout type = One horizontal time line

Layout pages = 1

Layout marker placement = Above graphical representation, as provided

Layout meta data placement = Centered at top of page

Audio Feature Extraction 602

Audio amplitude extraction and graphical approximation. An svg file is output.
Speech recognition is also applied followed by matching to a given list of phrases.

FIG. 10a.

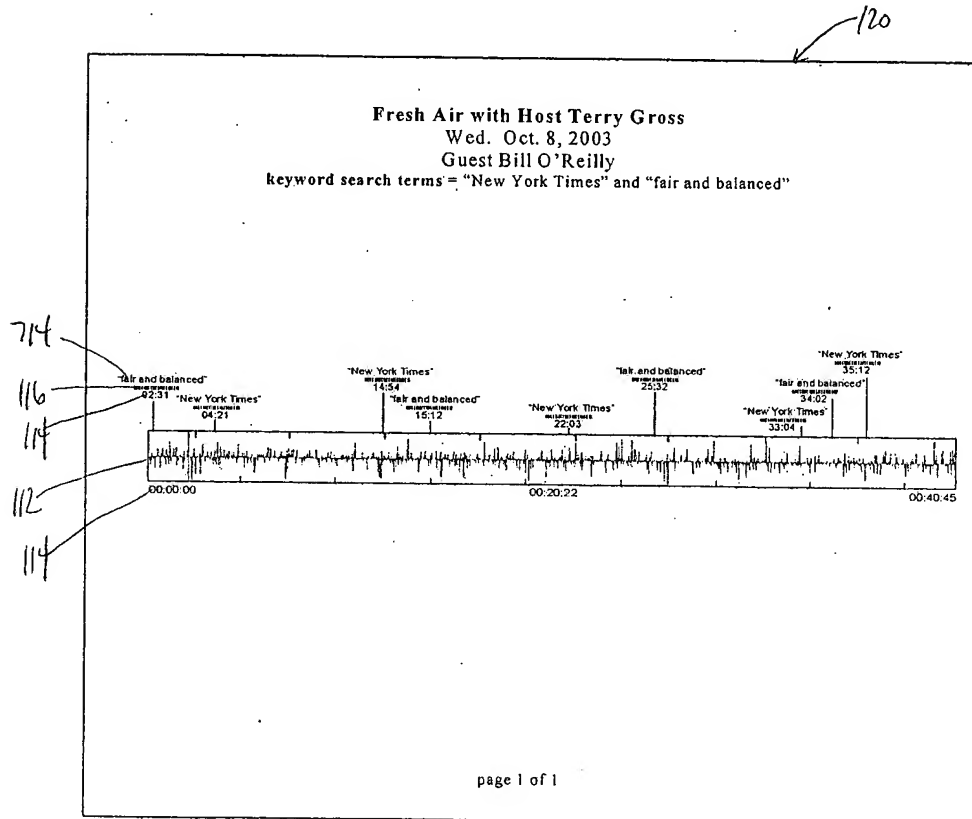


FIG. 10b

104 Document Format Specification

Type = Radio program
Identifier = 1773

Title = A Prairie Home Companion
Annotation = applause events shown
Publication Date = Sun. Oct. 12, 2003
Begin time = 00:00:00
End time = 01:58:56

Graphical Representation = Amplitude curve

702 Feature extraction = applause detection $\alpha=0.27$ $\beta=1.86$

Marker type = time stamp, bar code

Marker placement = above time line

Marker frequency = user-defined

Marker 1 = (00:02:13, bar code, pos. 1)

Marker 2 = (00:10:54, bar code, pos. 2)

Marker 3 = (00:12:32, bar code, pos. 3)

Marker 16 = (01:56:01, bar code, pos. 2)

Layout type = One horizontal time line

Layout pages = 1

Layout marker placement = Above graphical representation, as provided

Layout meta data placement = Centered at top of page

Audio Feature Extraction 602

Audio amplitude extraction and graphical approximation. An svg file is output.
Applause detection outputs time stamps.

FIG. 11a.

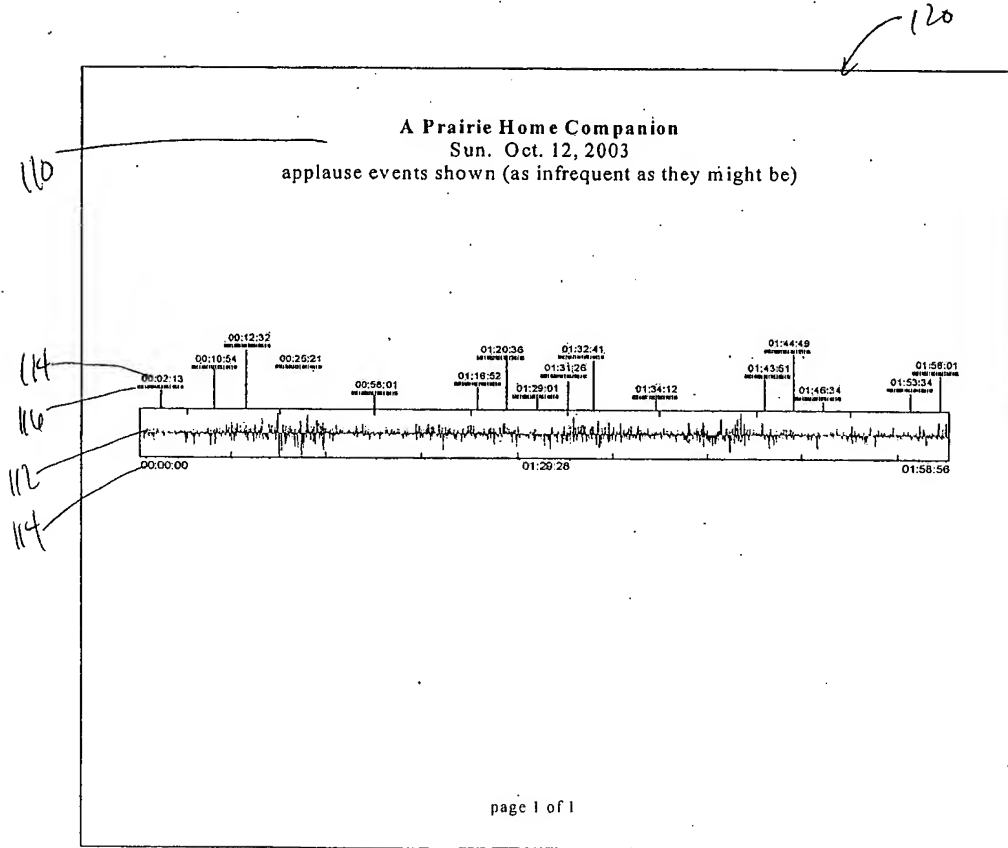


FIG. 11b

104 Document Format Specification

Type = Radio program
Identifier = 1774
Title = A Prairie Home Companion
Annotation = music events shown
Publication Date = Sun. Oct. 12, 2003
Begin time = 00:00:00
End time = 01:58:56
Graphical Representation = Amplitude curve
782 Feature extraction = music detection delta = 12.93
Marker type = time stamp, bar code
Marker placement = right of time line
Marker frequency = user-defined
Marker 1 = (00:21:54, bar code, horiz. pos. 1)
Marker 2 = (01:10:53, bar code, horiz. pos. 1)
Marker 3 = (01:34:01, bar code, horiz. pos. 1)
Marker 4 = (01:41:41, bar code, horiz. pos. 1)

672 Layout type = Two vertical time lines, split in half
Layout pages = 1
Layout marker placement = To right of graphical representation, as provided
Layout meta data placement = Centered at top of page

Audio Feature Extraction 602

Audio amplitude extraction and graphical approximation. An svg file is output.
Music detection outputs time stamps.

FIG. 12a

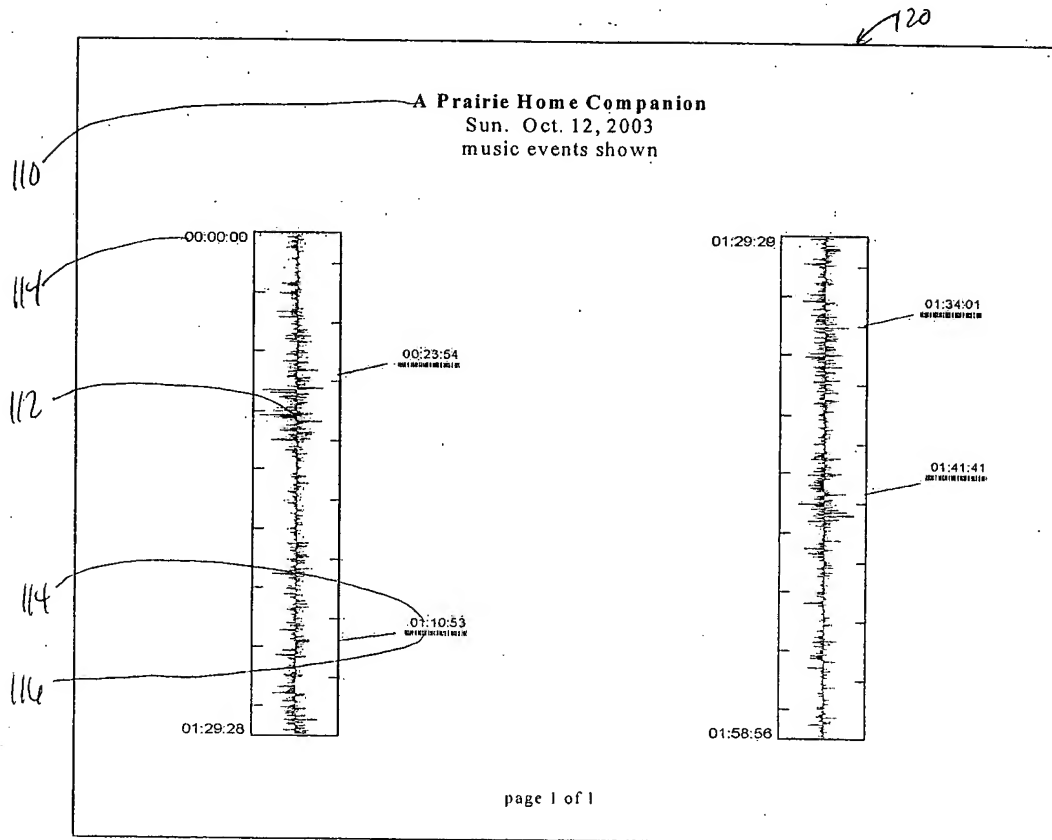


FIG. 12b